

EXHIBIT 22

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

-----X
FRANKLIN BUONO,

Plaintiff,

v.

POSEIDON AIR SYSTEMS, VICTORY AUTO
STORE, INC., VICTORY AUTO STORES, INC.
d/b/a POSEIDON AIR SYSTEMS,
WORTHINGTON INDUSTRIES, INC., AND
TYCO FIRE PRODUCTS LP,

Defendants.

Civil Action No. 1:17-cv-05915 (PMH)

-----X
TYCO FIRE PRODUCTS LP,

Third-Party Plaintiff,

v.

OPRANDY'S FIRE & SAFETY INC.,

Third-Party Defendant.

**DECLARATION OF CHASON J.
COELHO**

-----X

I, Chason J. Coelho, hereby declare as follows:

1. I was retained by counsel for Tyco Fire Products, LP, to conduct an analysis of human factors issues related to the rupture of the fire suppression test tank that occurred on February 12, 2016, at Oprandy's Fire and Safety Equipment, Inc., in Middletown, New York.

2. In connection with my analysis, I provided a report entitled "*Franklin Buono v. Tyco Fire Products*, 17-cv-5915 (S.D.N.Y.): Exponent Project No. 2001578.000" on April 16, 2020. A true and correct copy of my report is attached hereto as Exhibit A.

3. The contents of this report are true and correct to the best of my knowledge and belief.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Executed on this __1st__ day of February, 2021, at _Seattle, Washington_.

A handwritten signature in black ink, appearing to read 'Chason J. Coelho', written over a horizontal line.

Chason J. Coelho

EXHIBIT A

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

----- X
FRANKLIN BUONO,

Plaintiff,

v.

POSEIDON AIR SYSTEMS, VICTORY AUTO
STORE, INC., VICTORY AUTO STORES, INC.
d/b/a POSEIDON AIR SYSTEMS,
WORTHINGTON INDUSTRIES, INC., AND
TYCO FIRE PRODUCTS LP,

Defendants.

Civil Action No. 1:17-cv-05915 (NSR)
(LMS)

**EXPERT REPORT OF
CHASON J. COELHO**

-----X
TYCO FIRE PRODUCTS LP,

Third-Party Plaintiff,

v.

OPRANDY'S FIRE & SAFETY INC.,

Third-Party Defendant.

-----X



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April 16, 2020

James Kirkpatrick, Esq.
Williams & Connolly LLP
725 Twelfth Street, N.W.
Washington, DC 20005

Subject: *Franklin Buono v. Tyco Fire Products*, 17-cv-5915 (S.D.N.Y.)
Exponent Project No. 2001578.000

Dear Mr. Kirkpatrick:

At your request, I evaluated human factors issues related to the above-captioned matter in response to a report submitted by Mr. Taranto on behalf of the plaintiff. My evaluation included review of scientific literature on warning effectiveness and compliance, regulatory and industry standards, as well as case documents and materials provided to me. My qualifications to perform this evaluation are described in Section I below, and the documents and materials I received are listed in Section II.

I also attended an inspection of materials in Natick, MA, on May 20, 2019. My most recent CV and testimony list have been provided under separate cover. For calendar year 2020, Exponent charges \$290 per hour for my time, for all time billed. Please accept this report as explanation and summary of my opinions to date in this matter.

I. Qualifications

I am a senior managing scientist in the Human Factors Practice at Exponent where I apply an interdisciplinary expertise in human factors, safety, and risk management to evaluate loss events, proactively (before a potential adverse event) and retroactively (after an adverse event). As such, I evaluate warnings, labels, instruction manuals, training, and other related issues in the industrial setting. Overarching goals of my work include addressing human factors principles in areas such as design, policies, procedures, hardware, software, work environments, and communication.

I received a doctorate in cognitive psychology from the Pennsylvania State University. Prior to joining Exponent, I worked as a human factors design engineer supporting the International Space Station Program at NASA Johnson Space Center and later a human factors and risk professional. I have published several articles in peer-reviewed scientific journals and have presented at scientific meetings stateside and abroad. I have taught undergraduate courses on human cognition, research methods, and statistics in the Departments of Psychology and Labor Studies at The Pennsylvania State University.

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I am a human factors, technical safety, and risk management professional who holds a Certified Safety Professional designation from the Board of Certified Safety Professionals, a Certified Fire Investigator designation from the Texas Commission on Fire Protection, and a Safety Practice Certificate from Texas A&M University for advanced training in industrial hygiene, fire risk management, and other similar topics. I am a volunteer firefighter and emergency medical technician (EMT) who maintains firefighting, technical and confined space rescue, vehicle extrication, and EMT certifications.

As a result of my training and experience, I am familiar with the operation of air cascade systems used to fill compressed air cylinders and am knowledgeable about portable and fixed fire extinguishing and suppression systems. I am practiced at evaluating compliance with regulatory requirements, including those set forth by the Occupational Safety and Health Administration (OSHA) and am experienced at assessing conformance with various industry consensus standards, including those published by the American National Standards Institute (ANSI), International Organization for Standardization (ISO), National Fire Protection Association (NFPA), and others.

II. Materials Received

I received the following case documents and materials:

- Depositions
 - Dana Blakely
 - Franklin Buono, taken April 30, 2018, with Exhibits 1-9
 - Franklin Buono, taken July 23, 2019
 - James Getter, with Exhibits P-1 through P-7 and D-8 through D-12
 - Curtis Harding
 - Robert Hawkins
 - Patricia Hawkins-Scott, taken September 18, 2019
 - Patricia Hawkins-Scott, taken September 18, 2019 (30(b)(6)), with Exhibits 1-6
 - Adam Menor
 - Kimberly Tremberger, with Exhibits 14, 16, and 24-26
 - William Tremberger
 - Daniel Truex
 - Brian Scott, with Exhibits D-10 through D-23 and P-1
 - Kevin Slover
- Expert Materials
 - Report of Tom Taranto dated January 8, 2020

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- Pleadings and Discovery
 - Summons and Complaint dated June 15, 2017
 - Amended Complaint dated July 13, 2018
- Document Production
 - TFP's Production [TFP-280809-000001 - 60] Kitchen Knight Technical Manual - 1998; with 06-04-18 Supplemental Responses to Buono's RFP 4818-3173-1335_1.PDF
 - TFP's Production [TFP-280809-000061 - 113] Kitchen Knight II Technical Manual - 2001; with 06-04-18 Supplemental Responses to Buono's RFP 4847-1321-4851_1.PDF
 - TFP's Production [TFP-280809-000114 - 172] Photos of Scene from 02.12.16 Taken by NY State Police (1 of 2); with 06-04-18 Supplemental Responses to Buono's RFP.PDF
 - TFP's Production [TFP-280809-000173 - 231] Photos of Scene from 02.12.16 Taken by NY State Police (2 of 2); with 06-04-18 Supplemental Responses to Buono's RF.PDF
 - TFP's Production [TFP-280809-001120 - 1121] Drawings - Response to Buono's Demand for Discovery and Inspection, 11-26-18 4820-9422-2724_1.PDF
 - TFP's Production [TFP-280809-001122 - 1340] Report 4816-9689-8205_1.pdf
 - TFP's Production [TFP-280809-001341 - 1345] Report 4821-1632-8605_1.PDF
 - TFP's Production [TFP-280809-001346 - 1358] Report 4823-5120-9629_1.PDF
 - TFP's Production [TFP-280809-001359 - 1370] Report 4826-5319-9517_1.pdf
 - Wells Fargo Pyro Technologies letter dated June 17, 1998
 - OSHA Salt Lake Technical Center report dated May 5, 2016
 - OSHA Statements of Frank Buono and Christopher Foust [BUONO-001715 - 001722]
- Photographs
 - Photographs from 04_16_18 Evidence Exam (452; jpg, pdf)

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III. Incident Background and Summary

According to an OSHA technical report, on February 12, 2016, a “fire suppression tank” rated for 225 pound-force per square inch (psi) of pressure was being filled with compressed air, when it ruptured and injured two employees at Oprandy’s Fire & Safety Equipment (Oprandy’s) in Middletown, New York.¹ According to the OSHA report, the subject tank had been designated for balloon testing of kitchen fire suppression systems and had been refilled repeatedly using a quarter turn ball valve assembly to throttle the flow of air.²

At the time of the incident, Mr. Franklin Buono, an Oprandy’s service technician and plaintiff in this matter, was observing Mr. Christopher Foust, another Oprandy’s service technician, fill the subject tank with compressed air using a high pressure Poseidon cascade system (see Figure 1).³ My understanding is that the subject tank (cylinder) was manufactured by Worthington in August of 1998 and was provided by Tyco Fire Products (TFP) with its PYRO-CHEM KITCHEN KNIGHT®: RESTAURANT FIRE SUPPRESSION SYSTEM—PCL-240/350/550 and/or its PYRO-CHEM KITCHEN KNIGHT® II: RESTAURANT FIRE SUPPRESSION SYSTEM—PCL-300/460/600.⁴ In general, the purpose of the “balloon test” or “puff test” for which the subject cylinder was intended is to verify that fire suppression system piping is not obstructed, per NFPA 17A, *Standard for Wet Chemical Extinguishing Systems*.⁵



Figure 1. Poseidon cascade system used to fill the subject receiving cylinder

¹ OSHA Salt Lake Technical Center report dated May 5, 2016, p. 2

² OSHA Salt Lake Technical Center report dated May 5, 2016, p. 2; For clarity and consistency with relevant Compressed Gas Association (CGA) standards, subsequent sections of this report refer to the vessel that ruptured as the *receiving cylinder* and to the Poseidon cascade vessel, from which the receiving cylinder was being filled at the time of the incident, as the *source cylinder*.

³ OSHA Statement (Buono-001715-1722). In this statement, Mr. Buono referred to the receiving cylinder as a “test cylinder,” “air cylinder,” or “air tank” and the source cylinder as an “air tank” or “the Poseidon air tank.”

⁴ OSHA Salt Lake Technical Center report dated May 5, 2016; TFP-280809-000001; TFP-280809-000061; Note that the Taranto Report focuses on the Kitchen Knight II system, so the current report does also.

⁵ Deposition testimony of Mr. Harding (“Harding”), pp. 12-13, 30; NFPA 17A-2013

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IV. Scope and Methodology

The scope of my work in this case was to evaluate human factors issues related to the matter captioned *Franklin Buono v. Tyco Fire Products*, 17-cv-5915 (S.D.N.Y.), in response to a report submitted by Mr. Taranto on behalf of the plaintiff. Generally speaking, the field of human factors is a scientific discipline focused on how humans interact with products, environments, processes, other humans, and information related thereto.

The methodology I used was to (a) review case documents and materials, including the Taranto Report, to identify human factors-related case issues, (b) identify and review applicable standards and scientific literature, (c) analyze human factors-related case issues, including relevant assertions and opinions of Mr. Taranto, in the context of the identified standards and scientific literature, (d) develop opinions regarding these issues, and (e) prepare this report describing my opinions and the bases for those opinions.

V. Evaluation

This section reports my evaluation of human factors issues related to the incident at issue and in response to the January 8, 2020, report of Mr. Tom Taranto, expert for the plaintiff, Mr. Buono.

Taranto Report

Mr. Taranto is critical of TFP on the issues of labeling, training, and manual information related to the ruptured receiving cylinder. He offers multiple opinions on these issues and concludes that TFP failed in its “duty to warn.”⁶ What follows is discussion of these issues. A section summarizing the opinions I have reached in this matter is presented thereafter.

Taranto Opinions Regarding Labeling

Mr. Taranto alleges that a lack of on-product warnings on the receiving cylinder led to imprecise communication and complacency, which he identifies as contributing factors to the subject incident.⁷ Mr. Taranto also lists “failure to label the fire protection system tank that ruptured” in his causal factor chain summary.⁸ To support these criticisms, Mr. Taranto compares the appearance of an exemplar receiving cylinder (what he calls the “test tank”) to the appearance of another cylinder that comes pre-filled with wet chemical extinguishing agent, sold by TFP as part of the PYRO-CHEM KITCHEN KNIGHT® II: RESTAURANT FIRE SUPPRESSION SYSTEM—PCL-300/460/600 (what he calls the “agent tank”); see Figure 2.⁹

⁶ Report of Mr. Tom Taranto dated January 8, 2020 (“Taranto Report”), p. 68

⁷ Taranto Report, pp. 24-25

⁸ Taranto Report, p. 28

⁹ Taranto Report, p. 37

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FIGURE 4 – KITCHEN KNIGHT AGENT TANK AND TEST TANK PHOTOS



Figure 2. Reproduction of Figure 4 from the Taranto Report comparing the appearances of an exemplar receiving cylinder and an exemplar agent tank

The argument from Mr. Taranto can be summarized as follows. He affirms that the TFP label on the agent tank (PCL-300 in Figure 2 above) complies with NFPA 10, *Standard for Portable Fire Extinguishers*, then attempts to convince the reader that TFP failed in its responsibility to warn users of the hazards associated with its receiving “test” cylinder (PCL-300T in Figure 2 above) because it did not similarly label that cylinder.

Responses to Taranto Opinions Regarding Labeling

There are multiple flaws in the argument offered by Mr. Taranto. First, NFPA 10 does not apply to the receiving cylinder. Second, the standard that does apply assigns responsibility for labeling the receiving cylinder to the gas supplier (Oprandy’s in this case). Third, the warning-related assertions Mr. Taranto offers are predicated on assumptions not supported by the scientific literature on warning effectiveness and compliance. Each of these issues is addressed in more detail below.

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Regarding labeling of the agent tank, Mr. Taranto observes that:

“The agent tank has the Kitchen Knight label and the Test Tank has the top half painted green and bottom half painted red with no Kitchen Knight label, only the required DOT marking by the cylinder manufacturer.”¹⁰

Mr. Taranto asserts that:

“NFPA Standards have many requirements for product labels (see §8.1 Product Labels Tyco Fire Products PCL-300T & PCL-300, p57) and the TFP Test Tanks do not have any Product Labels, Nameplates, Warnings, Instructions, Dangers, or any other safety or use information permanently attached to the TFP Test Tank.”¹¹

Regulatory and industry consensus standards can provide useful references for the evaluation of loss events and relevant human factors issues. However, Mr. Taranto’s just-mentioned assertion regarding NFPA standards is misleading. It implies *multiple* NFPA standards with *many* product label requirements applicable to the receiving cylinder. These implications are inconsistent with the fact that later in his report, Mr. Taranto appeals only to NFPA 10 for labeling requirements and argues that TFP receiving cylinder labeling should have adhered to that standard.¹² This point notwithstanding, Mr. Taranto compares the appearance of an exemplar TFP receiving cylinder (PCL-300T in Figure 2 above) and an exemplar TFP agent tank (PCL-300 in Figure 2 above). He also reproduces the TFP agent tank label in Figure 5 of his report (see Figure 3 below).

FIGURE 5 – TYCO FIRE PRODUCTS NAMEPLATE PART NO. PC551235 PCL-300 AGENT TANK

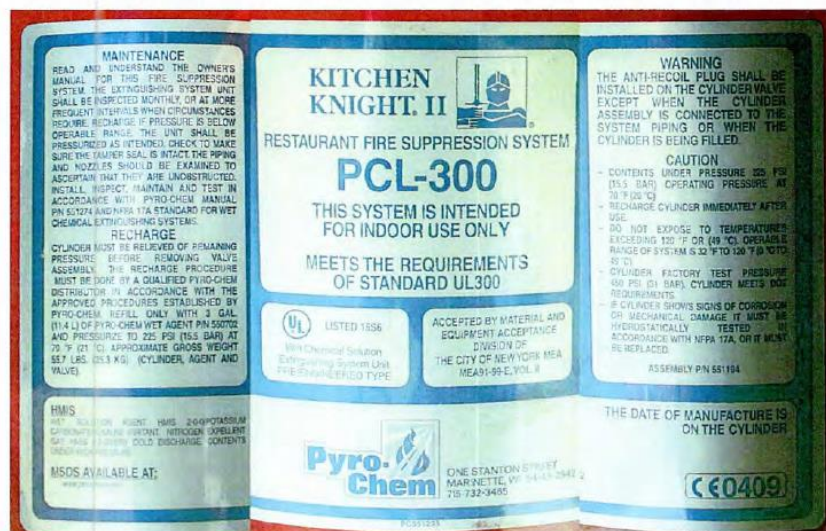


Figure 3. Reproduction of Figure 5 from the Taranto Report showing the label found on what Mr. Taranto refers to as the TFP “agent tank”

¹⁰ Taranto Report, p. 37

¹¹ Taranto Report, p. 47

¹² Taranto Report, pp. 57-60

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In his comparison, Mr. Taranto describes several positive features of the TFP agent tank label:

“It is common for manufacturers to use multiple methods of communication to warn of dangers associated with the use of a product. TFP includes such a label with the Kitchen Knight II[®] model PCL-300 Agent Tank;” and

“The TFP PCL-300 label Part No PC551235 prominently displays CAUTION Contents Under Pressure to the user with information such as the operating pressure of 225 psig, the factory test pressure 450 psi, if there are signs of corrosion or mechanical damage the cylinder must be hydrostatically tested. Additionally, the product nameplate identifies the Pyro-Chem Manual P/N 551274 and NFPA 17A which are two essential sources of additional information;” and

“The product nameplate also prominently displays sections with information related to MAINTENANCE, RECHARGE, and WARNING.”¹³

Mr. Taranto also notes that the OSHA technical report dated May 5, 2016, references NFPA 10.¹⁴ Mr. Taranto references several passages from NFPA 10 and notes that the TFP agent tank label complies with several of its requirements, including:

- a. NFPA 10, Section 7.8.4.5 regarding charging pressure;
- b. NFPA 10, Section 3.3.22.1 regarding extinguisher service pressure;
- c. NFPA 10, Section 3.3.22.2 regarding factory test pressure;
- d. NFPA 10, Section 7.8.1.3.1 regarding gross weight; and
- e. NFPA 10, Section 7.8.3.1 regarding chemical composition.¹⁵

Mr. Taranto portrays NFPA 10 as the single standard applicable to the receiving cylinder. This portrayal is inaccurate. First, NFPA 10 is not applicable to the receiving cylinder, as explained below. Second, and as explained in the OSHA technical report, OSHA’s reference to NFPA 10 is due to (purported) simpler and more direct language found in the standard relative to other standards.¹⁶ Indeed, the Taranto Report does not mention that the OSHA report explicitly notes the applicability of a separate set of standards by the Compressed Gas Association (CGA).

Mr. Taranto goes on to discuss the TFP agent tank label and its inclusion of additional information concerning the need for hydrostatic testing if there are signs of corrosion and mechanical damage, hazard identification, and maintenance.¹⁷

¹³ Taranto Report, pp. 47-48

¹⁴ Taranto Report, p. 57

¹⁵ Taranto Report, pp. 57-58

¹⁶ OSHA Salt Lake Technical Center report dated May 5, 2016, p. 10

¹⁷ Taranto Report, pp. 47-48

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Mr. Taranto then asserts that:

“Even with the knowledge that the PCL–300T Test Tank has the ‘the same inherent danger’ as the PCL–300 Agent Tank as relates to overpressurization TFP does not affix any nameplate, label, WARNING, CAUTION or HAZARD Labels on the PCL–300T Test Tank that TFP manufactures.”¹⁸

As noted above, there are problems with this claim. First, NFPA 10 is not the applicable standard for the receiving cylinder. Second, the standard that does apply to the receiving cylinder – CGA C-7–2014, *Guide to the Classification and Labeling of Compressed Gases* – assigns responsibility for cylinder labeling to the gas supplier.¹⁹ *Gas supplier* is defined by another relevant CGA standard, CGA P-1–2015, *Standard for Safe Handling of Compressed Gases in Containers*, as the business that produces, fills, and/or distributes compressed gases.²⁰ Note that the standard practice of TFP does *not* involve filling the receiving cylinder with compressed air before shipping it as part of the PYRO-CHEM KITCHEN KNIGHT® II: RESTAURANT FIRE SUPPRESSION SYSTEM—PCL-300/460/600; indeed, the cylinder leaves the manufacturer in an empty and unpressurized state, according to the deposition testimony of Mr. Menor.²¹ Thus, TFP cannot be considered the gas supplier in connection with the filling of the receiving cylinder at issue in this matter and was therefore not responsible for labeling the receiving cylinder. Each of these problems with the arguments of Mr. Taranto concerning labeling and NFPA 10 is explained next.

Regarding the issue that NFPA 10 is not applicable to the receiving cylinder, the 2013 Edition of NFPA 10 lists the following scope:

“The provisions of this standard apply to the selection, installation, inspection, maintenance, recharging, and testing of portable fire extinguishers and Class D extinguishing agents.”²²

NFPA 10 defines a portable fire extinguisher as follows:

“A portable device, carried or on wheels and operated by hand, containing an extinguishing agent that can be expelled under pressure for the purpose of suppressing or extinguishing fire.”²³

The receiving cylinder that ruptured during the incident at issue in this matter clearly does not meet the definition of a portable fire extinguisher. Because the scope of NFPA 10 also entails

¹⁸ Taranto Report, p. 48

¹⁹ CGA C-7–2014, Section 3; CGA C-7–1992, Section 1.2; The relevant OSHA technical report, dated May 5, 2016, identifies the “fire suppression tank” (i.e., the receiving cylinder) as having been manufactured in August of 1998, so two editions of the CGA C-7 standard (1992 and 2014) are referenced here to show consistency in the relevant requirements before and after the date of receiving cylinder manufacture.

²⁰ CGA P-1–2015, Section 3.2.15; The relevant edition of the CGA standard for safe handling of compressed gases in containers is CGA P-1–2015.

²¹ Deposition testimony of Mr. Menor (“Menor”), p. 15

²² NFPA 10-2013, *Standard for Portable Fire Extinguishers*, Section 1.1

²³ NFPA 10-2013, *Standard for Portable Fire Extinguishers*, Section 3.4.3

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Class D extinguishing agents that are manually applied,²⁴ it is worth noting that this scope element also does not apply to receiving cylinder or the larger Pyro-Chem Kitchen Knight® II system at issue in the current matter.

That Mr. Taranto makes no mention of these issues is particularly noteworthy given his citation of the following statement from Mr. Foust, the Oprandy's service technician who was refilling the receiving cylinder at the time of the rupture:

“What I was doing on the day of the accident doesn't actually apply to anything to do with fire extinguishers. I was just filling the cylinder with air all alone – there was no chemicals or extinguishment in that cylinder.”²⁵

Even though NFPA 10 is not applicable to the receiving cylinder or to the agent tank, it is understandable that TFP created an agent tank label that accorded with several NFPA 10 labeling and nameplate requirements, given that the agent tank is sold containing extinguishing agent under pressure.²⁶ Per the technical manual for the PYRO-CHEM KITCHEN KNIGHT® II: RESTAURANT FIRE SUPPRESSION SYSTEM—PCL-300/460/600:

“Cylinder sizes are expressed in terms of extinguishing agent capacity (i.e., the PCL-300 uses 3.0 gallons of extinguishing agent). The cylinder is manufactured, tested, and marked in accordance with DOT 4BW225. Cylinders come pre-filled with extinguishing agent and are charged with dry nitrogen to a pressure of 225 psig @ 70° F.”²⁷

By contrast, the receiving cylinder was not sold containing extinguishing agent, nor was it sold or shipped with any pressurized material in it, nor was it intended to function with any extinguishing material in it.²⁸ This information contravenes the argument made by Mr. Taranto that TFP should have created a label for the receiving cylinder that looked like the label on the agent tank.

The standard that does apply to the receiving cylinder (CGA C-7) assigns responsibility for labeling of the cylinder to the gas supplier, and both the 1992 and 2014 editions make this point clear.²⁹ Relevant excerpts are provided below.

²⁴ NFPA 10-2013, *Standard for Portable Fire Extinguishers*, Sections 4.1.3.3, 5.5.8

²⁵ OSHA Statement of Mr. Foust, p. 2, cited in Taranto Report, p. 26

²⁶ Because it is non-portable (once installed) and not hand-operated, the TFP agent tank does not meet the definition of a portable fire extinguisher under NFPA 10. However, the agent tank does contain an extinguishing agent that can be expelled under pressure, whereas the receiving cylinder does not.

²⁷ Kitchen Knight II Technical Manual, p. 2-1 (TFP-280809-000064)

²⁸ Menor, pp. 15-16, 36-37

²⁹ These two editions are provided here to demonstrate the consistency of the labeling requirements before and after the date of receiving cylinder manufacture.

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Paragraph 1.2 of CGA C-7–1992 states:

“It is the responsibility of the gas supplier to assure that the precautionary label adequately warns of physical and health hazards, provides appropriate precautionary measures, and complies with applicable government regulations.”

Section 3 of CGA C-7–2014 similarly states:

“It is the responsibility of the gas supplier to ensure that the labels adequately warn of physical, health, and environmental hazards, provide appropriate precautionary measures, and comply with applicable governmental regulations.”

The appendix of CGA C-7–1992 states:

“The removal or replacement of the BASIC MARKING shall, therefore, be performed only by the supplier responsible for the filling of the cylinder;” and

“The guidelines and precautionary statements, to be found elsewhere in this publication, have been prepared to assist the supplier in developing labeling.”³⁰

Section 9 of CGA C-7–2014 similarly states:

“It is the responsibility of the gas supplier to ensure that the label contains any additional information necessary to comply with applicable government regulations.”

The appendix of CGA C-7–2014 similarly states:

“The removal or replacement of the basic marking shall, therefore, be performed only by, or at the direction of, the supplier responsible for filling the cylinder.”³¹

The CGA standards explain that one reason this responsibility is assigned to the business expected to fill the container is that the labeling provides identification of any residual material that may be present in the cylinder.³² The business responsible for initially filling the receiving cylinder for operational or maintenance purposes is the business that would be expected to know what material may have previously been put into it. Moreover, NFPA 17A-2013 indicates that the “balloon” or “puff” test of fire suppression system piping can be conducted with compressed air *or* nitrogen. That TFP did not label the receiving cylinder accords with this fact. Indeed, the decision about what went into the receiving cylinder for the test was that of the entity performing the test (Oprandy’s in this case), not TFP.³³ Given that the standard practice of TFP was to ship the receiving cylinder empty of compressed gas, the business whose responsibility accords with the above-given definition of *gas supplier* in this matter, and by extension, with the charge for

³⁰ CGA C-7–1992, Sections A-7.4 and A-8

³¹ CGA C-7–2014, Section A.7

³² CGA C-7–1992, Section A-7.4; CGA C-7–2014, Section A.7

³³ NFPA 17A-2013, Sections 6.4.4.2-6.4.4.2.1, 7.4.3; Harding, pp. 57-59

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labeling the receiving cylinder under CGA C-7, is Oprandy's, not TFP. Taken together, this information invalidates Mr. Taranto's opinion that, "Tyco Fire Products failed in their duty to warn the service technicians injured in this incident."³⁴

As noted above, a third problem for the warning-related arguments Mr. Taranto offers is that they are predicated on assumptions which are not supported by the scientific literature on warning effectiveness and compliance. Mr. Taranto seems to imply that if TFP had provided additional information in a label on the receiving cylinder or in the technical manual for the PYRO-CHEM KITCHEN KNIGHT® II: RESTAURANT FIRE SUPPRESSION SYSTEM—PCL-300/460/600, then the overpressure incident at issue would not have happened.³⁵ However, the scientific literature on warning effectiveness and compliance does not support this notion.

The criticisms of TFP offered by Mr. Taranto regarding warnings via labels generally assume, and rely on the assumption, that warnings are effective in modifying the behavior of product users. However, scientific studies have shown that the mere presence of a warning does not ensure the behavior of the user changes as a function of that warning.³⁶ Moreover, studies have generally reported poor compliance with product warnings and instructions.³⁷ There are also multiple conditions which must be satisfied for a warning to be a mechanism of change in user behavior. A user must receive the warning information, which requires that user to search for or notice, attend to, and consume the information, and then understand the content of the warning message. Assuming the foregoing conditions are satisfied, the user must still then be willing to change a behavior in direct response to the warning information and must actually succeed in appropriately modifying a behavior, or set of behaviors, in accordance with the warning information. Failure to satisfy one or more of these conditions makes compliant behavior change unlikely.³⁸ Therefore, there is no scientific reason to state that the mere presence of a safety warning label affixed to the receiving cylinder would have led Mr. Foust to modify his behavior in a way that would have resulted in a different outcome in the subject incident.

The warning-related arguments and opinions of Mr. Taranto also depend on the assumptions that people search for and comply with available warning information with the purpose of minimizing risk of injury or death. Studies of real-world behavior have shown, however, that people often fail to search for or notice available warnings.³⁹ The Taranto Report notes that Mr. Buono looked for warnings or instructions on the receiving cylinder, "...when it became apparent that Mr. Foust was attempting to troubleshoot the tank filling problem."⁴⁰ However, it is not clear from the referenced testimony whether Mr. Buono was looking for warnings or for instructions on how to fill the cylinder.⁴¹ Moreover, there is no evidence that Mr. Foust, the service technician who was filling the receiving cylinder at the time of the rupture, looked for warnings or instructions. There

³⁴ Taranto Report, p. 28

³⁵ Taranto Report, p. 60

³⁶ Ayres et al., 1998; McCarthy et al., 1984

³⁷ Heckman et al., 2010; Mortimer, 2007

³⁸ Ayres et al., 1989; Rogers et al., 2000

³⁹ Bix et al., 2009; Goldhaber & DeTurck, 1989

⁴⁰ Taranto Report, p. 49

⁴¹ Deposition testimony of Mr. Buono, Vol. 1 ("Buono, Vol. 1"), p. 81

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is also no evidence that either of the Oprandy's service technicians looked for warnings in the Kitchen Knight II® technical manual. In fact, Mr. Buono indicated in his deposition testimony that he never asked to look for a manual related to the air cylinder or the air filling system,⁴² and Mr. Scott, an owner of Oprandy's, indicated in his deposition testimony that neither Mr. Foust nor Mr. Buono had ever seen the technical manual for the fire suppression system at issue.⁴³

Returning to Mr. Taranto's assumption that people search for and comply with available warning information, a review of accident data and relevant scientific literature found no evidence that accident or injury rates decreased with the introduction of new warning labels.⁴⁴ Even when people notice a warning, there is no guarantee that the person will actually consume the warning information.⁴⁵ Moreover, consuming warning information does not ensure that that consumer will choose to comply with the warning.⁴⁶ In summary, the scientific literature on warning effectiveness and warning compliance indicates that warnings and labels cannot be relied upon to modify user actions such that safety behavior improves.

There does not appear to be a general predisposition of people against complying with warnings. Rather, it is thought that (a) multiple human-related variables can be significant in determining safe use of a product, (b) these factors include, but are not necessarily limited to, prior user knowledge and past experience,⁴⁷ user intentions,⁴⁸ state of attention of the observers,⁴⁹ and the probability that relevant visible features are noticed,⁵⁰ and (c) these factors are independent of the warning characteristics present. The scientific literature therefore suggests that factors associated with human users are fundamental to determining whether and how a warning is searched for, noticed, read, or complied with, independent of characteristics of the warning itself.

Examples of relevant human-related variables that could have impacted compliance with warnings in this case include prior knowledge and past experience and user intentions. Regarding prior knowledge and past experience, Mr. Scott indicated that Mr. Foust had knowledge of the correct fill and limit pressures for the receiving cylinder.⁵¹ Mr. Foust also had experience filling that same cylinder.⁵² Regarding user intentions, as noted above, there is no evidence that Mr. Foust – the user who was filling the receiving cylinder at the time of the rupture – intended to look for warnings or instructions before filling the cylinder. Thus, there is no scientific reason to state that affixing a label that listed fill pressure, limit pressure, or other safety information on the receiving cylinder that Mr. Taranto suggests should have been listed,⁵³ would have resulted in a different outcome.

⁴² Buono Vol. 1, pp. 81-82

⁴³ Deposition testimony of Mr. Scott ("Scott"), pp. 24-25

⁴⁴ Arndt et al., 1998

⁴⁵ Friedmann, 1988; Strawbridge, 1986

⁴⁶ Mortimer, 2007

⁴⁷ Krauss et al., 2008

⁴⁸ deTurck & Goldhaber, 1988; Friedmann, 1988

⁴⁹ Cole & Hughes, 1984

⁵⁰ Rauschenberger, 2003

⁵¹ Scott, p.101

⁵² OSHA Statement of Mr. Foust, p. 2

⁵³ Taranto Report, p. 25

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In summary, Mr. Taranto opines that TFP had a responsibility to put a warning label on the receiving cylinder and that TFP should have included warning information about the receiving test cylinder in its technical manual. He implies that if TFP had done these things, then the Oprandy's service technician would not have overpressured the receiving cylinder in the incident at issue. However, applicable industry standards and scientific literature on warning effectiveness and compliance provide no support for these assertions. In fact, the industry standards and scientific literature contravene these assertions and the overarching suggestion that a purported lack of information associated with the TFP fire suppression tank (i.e., the receiving cylinder) led to complacency, which in turn led to problems in the handling, servicing, and uses of the receiving cylinder, and then to the rupture.⁵⁴

Taranto Opinions Regarding Manual and Training Information

Mr. Taranto is critical of the actions, knowledge, skills, abilities, and training of the Oprandy's service technician who was filling the receiving cylinder at the time of the incident at issue. In particular, Mr. Taranto notes a lack of ability to troubleshoot the problems of not hearing air flow and observing the cylinder mounted pressure gauge to assess the charging status of the cylinder.⁵⁵ Mr. Taranto also notes as problematic that the Oprandy's service technicians did not have access to relevant manuals, procedures, and instructions.

Mr. Taranto suggests that the problematic actions, knowledge, skills, abilities, and training of the Oprandy's service technicians were related to the TFP training and technical manual. He opines that the TFP manual and training are defective and that the TFP Kitchen Knight II technical manual is non-compliant with NFPA 17A. I disagree with these assertions.

The crux of this argument is the allegation that the TFP technical manual should have contained a filling procedure for the receiving cylinder. Because NFPA 17A requires training to be based on the design, installation, and maintenance manual from the manufacturer, Mr. Taranto argues that both the training and the manual are therefore defective.

Responses to Taranto Opinions Regarding Manual Information

For at least three reasons, it is sensible that the TFP Kitchen Knight® II technical manual did not contain a procedure for filling the receiving cylinder. First, it is impossible for TFP to anticipate all the methods and equipment that a gas supplier (Oprandy's in this case) can use to fill the receiving cylinder. A given gas supplier can, operationally speaking, connect the receiving cylinder directly to an air compressor, to a high pressure cascade system – as the Oprandy's service technician did in this incident – or to some other type of compressed air tank, to an onsite nitrogen generator and associated equipment, or to a source cylinder containing nitrogen. Different manufacturers and designers of air compressors, cascade systems, and other equipment may incorporate various levels of operating and source cylinder pressure, equipment design, and

⁵⁴ Taranto Report, p. 27

⁵⁵ Taranto Report, p. 24

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settings configurations. That all these possibilities exist makes it impracticable for TFP to provide the procedure for filling a compressed air cylinder called for by Mr. Taranto.

Second, installers and maintainers of the PYRO-CHEM KITCHEN KNIGHT® II: RESTAURANT FIRE SUPPRESSION SYSTEM—PCL-300/460/600 are expected to have training beyond a lay person in general principles of safe handling and use of compressed gas cylinders. These types of cylinders are commonly used in testing and maintenance of fixed fire suppression system piping.

Regarding training, Section 7.3.1 of NFPA 17A specifies that:

“A service technician who performs maintenance on an extinguishing system shall be trained and shall have passed a written or online test that is acceptable to the authority having jurisdiction.”

Moreover, there is no evidence that any formal training on transfilling operations with the Poseidon cascade system was delivered to Mr. Foust, nor is there evidence that Oprandy’s sought out any such training from the manufacturer for Mr. Foust. In fact, Mr. Scott indicated in his deposition testimony that he informally trained Mr. Foust on his own “in-house” procedure, not the procedure provided by Poseidon.⁵⁶

Third, installers and maintainers of these systems are expected to be familiar with, and operate in compliance with, applicable safety and health standards. Indeed, OSHA incorporated by reference such an applicable standard: CGA P-1–1965, *Safe Handling of Compressed Gas (Fifth Edition)*.⁵⁷ This fifth edition has become obsolete, however, and has been replaced by CGA P-1–2015, *Standard for Safe Handling of Compressed Gases in Containers (Twelfth Edition)*. There are several definitions and requirements in this standard that apply to the incident at issue.

Section 3.2.6 of CGA P-1–2015 defines *containers* as:

“Vessels meeting the specifications of ASME, TC, or DOT of various shapes, sizes, materials of construction, and designs.”

Section 3.2.10 defines *cylinder* as a:

“Pressure vessel designed for pressures higher than 40 psia (276 kPa, abs) and having a circular cross section.”

The receiving cylinder in this incident is therefore a type of container.

⁵⁶ Scott, pp. 14, 19-20

⁵⁷ 29 CFR §1910.6(l)(6) – IBR [incorporation by reference] approved for 29 CFR §1910.101(b), *Compressed Gases*; See also <https://www.osha.gov/laws-regs/standardinterpretations/1992-06-05>

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Section 3.2.30 defines *transfilling* as:

“Transfer of cryogenic liquid and/or compressed gas from one container to another.”

The operation Mr. Foust of Oprandy’s was performing at the time of the subject incident, transferring compressed air from a source cylinder in a high pressure cascade system to the receiving cylinder, qualifies as transfilling. This observation has implications for the present matter because transfilling carries certain requirements of both the gas supplier (i.e., Oprandy’s) and of the manufacturer of the transfilling equipment (i.e., Poseidon). These and additional requirements are discussed in more detail next.

CGA P-1–2015, Section 5.7 (Transfilling) states:

“The transfer of compressed gases from one container to another shall be performed only by the gas supplier or by personnel who are:

- trained in and use equipment designed for this purpose; and
- trained in and follow written operating procedures that include the precautions necessary to avoid the product's hazards and that comply with government standards and regulations.”

CGA P-1–2015, Section 5.7 also states:

“The supplier of the transfill equipment shall provide detailed written operating instructions that include equipment inspection and maintenance procedures.”

The procedure for transfilling the receiving cylinder Mr. Taranto calls for was therefore required to come from Poseidon (the cascade manufacturer), not TFP. Mr. Scott’s deposition testimony indicates that a Poseidon procedure was available, but that this procedure was not given to Mr. Foust. In fact, Mr. Scott indicates that despite the existence of a Poseidon procedure, he trained Mr. Foust on his own “in-house” procedure, and he never showed Mr. Foust any documentation, owner’s guide, or product, service, or technical manual related to the Poseidon system.⁵⁸

It makes sense that the responsibility for providing such instructions would fall on the supplier of the transfill equipment because, as indicated above, there is significant variability in the manufacturers and designs of air compressors, cascade systems, and other equipment which can involve various levels of operating and source cylinder pressure, equipment design, and settings configurations. By contrast, there is less variability (i.e., more consistency) in the design of containers like the receiving cylinder, which was designed according to regulatory requirements. Furthermore, the responsibility to ensure that employees are trained in safe handling and use of compressed gases lies with their employer (Oprandy’s in this case, not TFP).⁵⁹

⁵⁸ Scott, pp. 14, 19-20

⁵⁹ <https://www.osha.gov/as/opa/worker/employer-responsibility.html>

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CGA P-1–2015, Section 5.1 states:

“Compressed gases shall only be handled and used by persons trained in their safe handling and use.”

Mr. Taranto similarly opines that, in his words, “vague or incorrect guidance” is a contributing factor to the subject incident:

“Vague or incorrect guidance is a contributing factor to the event. The only reference to Test Tanks is in the Kitchen Knight II Manual which is limited to a Model No. and Part No. only;” and

“In the system recharge section of the manual the instruction for pressurizing the Agent Tank is vague stating only ‘Reinstall valve and pickup tube and pressurize tank to 225 psi and reinstall to piping’;” and

“The guidance provided in the manual could be much more specific by including required elements of NFPA 10 such as; a regulated pressure source set no higher than 25 psi above the operating pressure; and, use a pressure gauge calibrated with the past year. The guidance could refer the user to NFPA 10 for additional information. Similar guidance could be added to address pressurizing TFP Test Tanks.”⁶⁰

This opinion is problematic. First, suggesting that TFP list requirements of an external standard in its manual ignores part of the utility in external standards, namely that they provide compiled sources of relevant, external information; adding such materials to the manual would be needless. Second, and as discussed above, NFPA 10 does not apply to the agent tank or the receiving cylinder. Thus, it is *not* reasonable for Mr. Taranto to suggest that TFP should reproduce language from the NFPA 10 standard on portable fire extinguishers in its fixed fire suppression system manual. Third, and as OSHA notes, the standard Mr. Taranto claims should have been reproduced in the manual should have already been very familiar to a company that advertises itself as experts in fire extinguisher installation and repair (see Figure 4).⁶¹

CONTINUED ON NEXT PAGE

⁶⁰ Taranto Report, p. 25

⁶¹ OSHA Salt Lake Technical Center report dated May 5, 2016, p. 10

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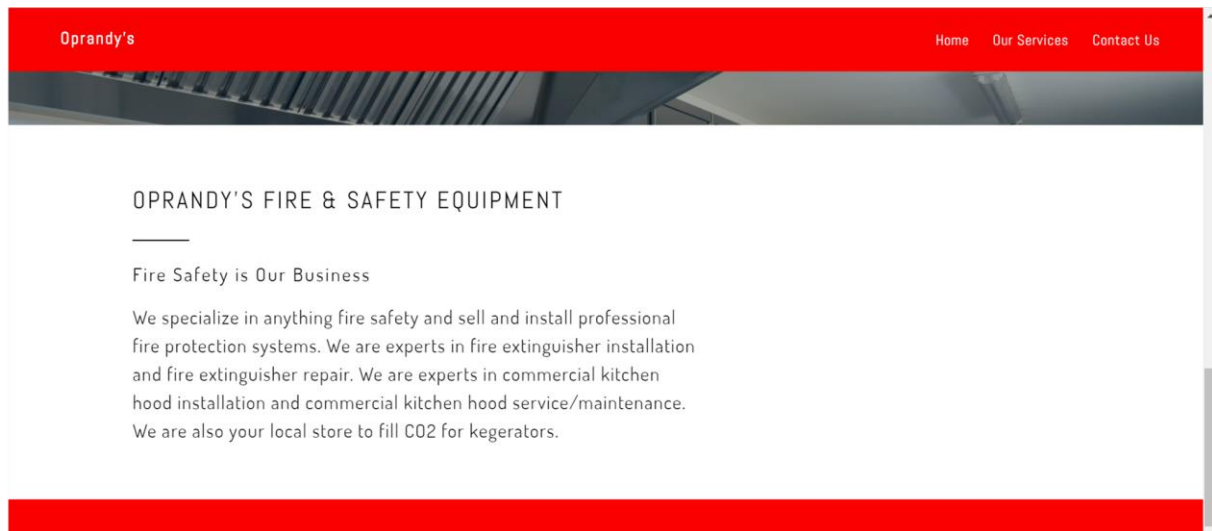


Figure 4. Screenshot of the Oprandy's website (<https://www.oprandysfire.com/>)

In a related opinion, regarding “complacency” as a contributing factor, Mr. Taranto states:

“With greater attention given to Agent Tanks as compared to Test Tanks, it could be interpreted that Agent Tanks containing various chemicals are significantly more dangerous and pose a greater hazard when handled, serviced and used than that posed by Test Tanks.”⁶²

This suggestion may seem intuitive, but it is complete conjecture. Mr. Taranto does not support or substantiate this statement in any way. Moreover, he offers no evidence that there is a direct and positive correlation between amount of safety information presented to the user and perceived importance of that information on the part of the user. By contrast, scientific studies actually offer evidence for the opposite relation: introducing additional warning information may reduce compliance by decreasing the perceived significance of any single warning.⁶³

Responses to Taranto Opinions Regarding Training Information

The CGA P-1–2015 requirement that the supplier of the transfill equipment provide instructions undermines Mr. Taranto's suggestion that the TFP technical manual should have contained a filling procedure for the receiving cylinder, and that because NFPA 17A requires that training be based on the design, installation, and maintenance manual of the manufacturer, TFP's training was non-compliant NFPA 17A.⁶⁴

⁶² Taranto Report, p. 27

⁶³ Chen et al., 1997; Frantz et al., 2000

⁶⁴ Taranto Report, p. 52

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To support the foregoing argument, Mr. Taranto cites the definition of a *trained person* given in NFPA 17A:

“A person who has undergone the instructions necessary to safely design, install, and reliably perform the maintenance and recharge service in accordance with the manufacturer’s design, installation, and maintenance manual.”⁶⁵

Mr. Taranto then concludes that:

“...it is impossible for any person to be trained to, ‘safely design, install, and reliably perform the maintenance and recharge service’ with respect to Tyco Fire Products component ‘PCL-300T Test Tank Part No. 551204’.”⁶⁶

This conclusion and the argument offered to support it, however, overlook CGA P-1–2015, which places responsibility for detailed transfill procedures on the supplier of the transfill equipment.

Continuing with relevant requirements from CGA P-1–2015, recall that the CGA C-7 standard requires the gas supplier to affix the appropriate safety-related label and markings to the air cylinder. Relevant to this issue, CGA P-1–2015, Section 5.2.3 states:

“Containers not bearing a legibly written, stamped, or stenciled identification of the contents shall not be used.”

To the extent the receiving cylinder lacked the necessary safety-related label and markings, it was Oprandy’s—not TFP—who was responsible for providing that information under CGA C-7.

Finally, CGA P-1–2015, Section 5.3 (User Responsibilities) states:

“The user [of compressed air containers] is responsible for the safe handling, use, and storage of the container and its contents ...”

Note that in this case, Oprandy’s was both the gas supplier and the user. The statement above clearly places the ultimate responsibility for safely handling the receiving cylinder on the user of the cylinder, not the manufacturer of the cylinder. Thus, it was the responsibility of Oprandy’s to ensure that Mr. Foust received proper training on transfilling procedures.

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⁶⁵ NFPA 17A-2013, Section 3.3.18; see Taranto Report, p. 52

⁶⁶ Taranto Report, p. 52

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VI. Summary of Opinions

Based on the evaluation presented above, the scientific and industry literature cited, the materials I reviewed, and my education, training, and experience, I have reached the following opinions in this matter:

1. The opinion of Mr. Taranto that TFP failed in its “duty to warn” because it did not label the receiving cylinder in accordance with NFPA 10 is incorrect insofar as (a) it rests on assumptions about the relations between warnings and human behavior that are not supported by scientific literature on warning effectiveness and compliance, (b) NFPA 10 does not apply to the receiving cylinder, and (c) the standard that does apply to the receiving cylinder (CGA C-7) assigns responsibility for safety labeling of the cylinder to the gas supplier (Oprandy’s), not TFP.
2. The opinion of Mr. Taranto that TFP failed in its “duty to warn” because it (a) did not include warning information about the receiving cylinder in a label or in its technical manual and (b) caused complacency in Oprandy’s service technicians through this omission is contravened by the applicable industry and scientific literature on warning effectiveness and warning compliance.
3. The opinion of Mr. Taranto that the TFP technical manual is defective and non-compliant with NFPA 17A because the manual does not contain a filling procedure for the receiving cylinder is incorrect insofar as (a) it is impossible for TFP to anticipate all the various methods, equipment, and material that can be used by the gas supplier to fill the receiving cylinder, (b) installers and maintainers of the PYRO-CHEM KITCHEN KNIGHT® II: RESTAURANT FIRE SUPPRESSION SYSTEM—PCL-300/460/600 are expected to have training beyond a lay person in general principles of safe handling and use of compressed air cylinders, and (c) the CGA P-1–2015 standard assigns responsibility for providing detailed written operating instructions to the supplier of the transfill equipment (Poseidon), not TFP.
4. The opinion of Mr. Taranto that because the TFP technical manual is (purportedly) defective and because NFPA 17A requires training to be based on the manual, the TFP training is defective and TFP is non-compliant with NFPA 17A is incorrect insofar as CGA P-1–2015 requires that detailed written operating instructions come from the transfill equipment manufacturer (Poseidon). Therefore, this opinion is inappropriately based on a false premise, and its underlying logic does not follow.

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5. The opinion of Mr. Taranto that vague or incorrect guidance was a contributing factor to the subject incident and that the guidance provided in the TFP technical manual could have been much more specific by including required elements of NFPA 10 is problematic insofar as (a) the NFPA 10 standard on fire extinguishers does not apply to the receiving cylinder at issue in this incident and (b) it is unreasonable to suggest that TFP should have reproduced in its technical manual an NFPA standard with which a company like Oprandy's should already be familiar.
6. The opinion of Mr. Taranto that because there was more (purported) attention given to the agent tank compared to the receiving tank, it could be interpreted to mean that the agent tank is significantly more dangerous and poses a greater hazard when handled compared to the test tank is complete conjecture. Mr. Taranto presents no evidence to support this opinion, and it is inconsistent with scientific literature on warning effectiveness, warning compliance, and perceived risk.
7. The ultimate responsibility for safely handling the receiving cylinder was, and is, that of the user of the cylinder, not the manufacturer of the cylinder, according to the CGA P-1–2015 standard applicable to the subject incident and to Oprandy's.

My opinions are based on scientific and industry literature cited, materials I reviewed, and my education, training, and experience, and they are presented here with a reasonable degree of scientific certainty. My opinions are based on work accomplished to date, and I reserve the right to modify any of them upon production of additional information and materials, or through additional work in this matter. If requested, I can prepare and present a basic tutorial to explain the concepts related to my opinions set forth in this report. I can also provide further background on issues such as human factors, occupational safety, standard compliance, and risk management. I may use demonstrative exhibits to summarize or explain my testimony, and I reserve any right that I have to do so.

Sincerely,

A handwritten signature in black ink, appearing to read 'Chason Coelho'.

Chason Coelho, PhD, CSP, CFI
Senior Managing Scientist
Exponent | Human Factors

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